Conditions of Oil Fields and Development in Indiana, 1914.

By Edward Barrett.

The Continental War in Europe has affected the movement of most commercial commodities in this country, and consequently the prices of such commodities, but none perhaps have been as seriously affected as petroleum and its by-products. These products seem to be very sensitive to any curtailing of the export trade of the country, and they respond immediately to fluctuating conditions.

The war has practically shut off oil exportations; as a consequence the supplies of oil in this country exceed the demand. The first effect of the curtailing of the export trade in oil was a lowering of the price from $1.35 per barrel to 75c per barrel, a reduction of practically 45% on the barrel.

With this tremendous reduction in the price of crude oil, investment in oil properties and development in oil territory practically came to a standstill; particularly is this true in untried and untested territory, and also in territory that is believed to be worked out or exhausted to a large extent. A large portion of Indiana would fall under the above conditions. Even in the newest developed field in Indiana, viz., Sullivan County, oil investment and development have been reduced perhaps 50%.

Possibly there has never been a time in the history of oil in this State when as many persons, and as much capital, stood ready to enter the oil business as at the present time, and these are waiting the time when our ports will be open for exportation and the consequent rise in price.

There never was a time, too, when readiness to invest and develop was as *general* over the State as at the present time. The areas awaiting development, as reported to this Department, include the following:

Noble, Lagrange, Pulaski, Jasper, Miami, Wells, Grant, Howard, Fountain, Hamilton, Madison, Delaware, Hancock, Hendricks, Putnam, Vigo, Owen, Shelby, Rush, Decatur, Greene, Sullivan, Knox, Daviess, Martin, Orange, Jackson, Washington, Scott, Clark, Harrison, Perry, Spencer, Dubois, Pike, Gibson, and Posey.

The above list may not include all the counties awaiting investment and development, but they do include all the areas, and they

show the widespread interest in oil development. The distribution of these counties shows also that every known oil and gas formation in Indiana is to be exploited. The tendency, too, of oil drillers and operators is toward deeper borings, and this will make all tests more thorough.

In the old Trenton field in the eastern part of the State, borings below the Trenton formation were not necessary, as the strata and conditions for the accumulation of oil and gas below Trenton, offered no inducements. But as we go westward in the State, the number of superincumbent strata increases every few miles, and some of these strata are known oil bearing rocks. To illustrate, some oil and gas are found in the Jeffersonville limestone (Corniferous) and in the Devonian shales (Genesee); again in the Huron limestones and shales; and still farther west in the Mansfield sandstone, and possibly in the Carboniferous limestones and shales. All of these, with the intervening formations, add to the total thickness of the crust as we advance westward in the State, until we reach the Coal Measures. The added thickness probably amounts to a total of from 1,500 to 2,000 feet; and this thickness would have to be added to the old Trenton rock depth in drilling for Trenton rock oil in the western part of the State. As a rule, too, drillings for oil in the several formations mentioned would have to be deeper than in the old Trenton rock field, which averaged about 1,000 feet. The exception to this is found in Sullivan County, where the wells run from 600 to 800 feet in depth.

There have been about 35,000 oil and gas wells drilled in Indiana in the last twenty-five years. Probably 30,000 of these were drilled in the Trenton rock field, and the rest in counties in various parts of the State.

The following is from the Oil City Derrick:

"The development of oil resources back in the early nineties opened at that time a new area of prosperity to the State of Indiana, and it is scarcely an exaggeration to say that petroleum did exceed in value any other industry in the State at the time, helped along by the wonderful gas development that brought many large manufacturing plants from other sections of the country. True, the interest that attaches to an oil well is perhaps lacking in the interest inseparable from other industries, and yet the crude product of the Eocene or Neocene age has not been without its romance in ancient times, and also in modern history. But in these rapid living days the practical side of life is what appeals to the multitude, and any new invention or new development of nature's re-

sources that tends to add to the material strength and capability of the nation may be counted as a factor in the broadening out and development of civilization.

"While the knowledge of the existence of oil in Indiana dates back to a time long anterior to the advent of Gaspar de Portala's little band of missionary friars, and when the Godfrey tribe of Indians were roaming over the territory adjacent to Montpelier, the successful development of these hidden sources of wealth is so recent that the importance of the industry that had sprung into existence was not yet fully developed until early in the Nineteenth century, and was not appreciated during the early nineties.

"Indiana's first oil excitement dates back to 1862, when oil springs were found on Otter Fork and West Fork and along the streams tributary to them, in Crawford County. There were a number of springs from which small quantities of oil could be collected. The oil rock could be found in many places. At one place on Otter Fork the bed of the creek was soft black sandstone, or shale, which contained more than 30 per cent of oil.

"During the oil excitement of 1862-66 when oil springs were found on Otter Fork and West Fork, oil seekers flocked to that county and the excitement ran high. Several wells were drilled, but oil in paying quantities was never found. On the farm of J. J. Clark a well was drilled during the oil excitement, but only a small quantity of oil mixed with salt water was obtained. At 408 feet, in this well natural gas was found, and at 648 feet salt water and a small amount of oil.

"The second oil excitement in the State dates back to 1865, when an artesian well being drilled for water at Terre Haute, Vigo County, found oil at a depth of 1,630 feet. During the following five years three more wells had been drilled in that locality, and all found quantities of sulphur water, with more or less oil. It was not until 1888, however, that this oil development attracted the attention of operators. It was on May 6th of that year that the Phoenix well was drilled in, and for a dozen years yielded an average of 1,000 barrels or more a month. The result of this strike was like that of all similar ones in the history of the oil industry. Hundreds of oil operators from far and near flocked to Terre Haute. Real estate was usually almost doubled in price. Twenty-four new companies were formed, eighteen of which made locations. A dozen or more wells were drilled to the required depth within three miles' radius of the Phoenix well, struck the proper stratum, and, for the most part, found—nothing. Terre Haute never did make an oil field.

"*The Oil Area.*—The great bulk of Indiana's oil is derived from the Trenton rock formation in Wells, Blackford, Jay, Adams, Grant, Huntington, Delaware, Randolph, Madison, Hamilton, Marion, Miami and Wabash counties. The Indiana field is but an extension of the Ohio Trenton rock district, which was discovered several years previous to the Indiana field. The Ohio development was extended rapidly, and test wells drilled to the south and west of the original strikes in Wood, Hancock and Allen counties of Ohio indicated an extension toward the Indiana line, the result being that a test well was drilled at Eaton, Delaware County, in 1885, which resulted in a large gas well, making the beginning of the development of the great Indiana gas and oil field. The Indiana Trenton rock field extends over a large area, commencing with the Ohio line at its eastern boundary, and extending westward approximately 50 miles into the central portion of the State. On the north of the principal oil pools will be found an immense area of territory in which the oil formation has been filled with blue lick water, making it an impossibility for the oil reservoir to contain oil in commercial quantities, except in certain isolated pools, where the terrace structure or slight anticlinal folds may have trapped the oil and gas.

"In the southern part of the field, notably in what is known as the Camden district in Jay County, and also in several of the isolated pools located in the gas area near Alexandria, Marion and Hartford City, the principal pays are found from 80 to 200 feet in the Trenton, the upper portion of the formation in these districts being filled with natural gas at considerable pressure when the field was new. In the eastern end of the field, known as the Geneva district, all of the profitable pays were found located in the upper 60 feet of the Trenton. In the early days of the excitement, gas was so plentiful that it was wasted. Large flambeaux would be seen in all parts of the field, with millions of cubic feet of the natural fuel going to waste daily. At that time it was thought that the supply would always last, but in later years it was discovered that not near enough gas could be found to furnish fuel for the pumping of the wells, and for that reason thousands of wells were pulled out and abandoned that would have been snug fortunes for their owners had there been a supply of gas to handle them cheaply. This great waste of Indiana gas caused other States to adopt the conservation policy of handling it, and many States have profited from the experience in Indiana.

"*First Paying Oil Strike.*—The first real oil well was drilled in Indiana in 1886 and located near Portland, in Jay County, but

was abandoned. Numerous wells were drilled in the same vicinity and it was up to Benjamin F. Fulton to start the ball rolling by drilling in a 35-barrel producer. It was at this well that the first real disaster occurred in the Indiana field. Oil was being used for fuel on the James Penn farm, and an explosion caused the death of the driller. The first paying oil well was drilled in Indiana in June, 1890, and was owned by the Northern Indiana Oil Company, and located on the D. A. Bryson farm, in Chester Township, Wells County, near the town of Keystone, north from Montpelier. This well started at 60 barrels a day natural, but within three months had dropped to 25 barrels a day. Then it was given a shot and increased to 90 barrels a day. This same company drilled several wells in the vicinity of the Bryson well without results. The second scene of operation was on the Cory farm, in Nottingham Township, Wells County, where Edward J. Little, a resident of Toledo, Ohio, at the time, but now deceased, drilled in a well that started at 250 barrels.

"The best oil wells found in the Indiana field were located in the heavy gas belt near Camden, Jay County, known as Pennville, and in Penn Township. Wells showing a production above 3,500 barrels were drilled in this pool, but the life of the wells was short as they blew out in a few years, as did the gas in the same field. Another important and productive pool was located in the northwest corner of the same township, and known as the Harris. This pool was void of the big gushers but was a very exciting development, as many wells of the 200 barrel size were drilled in daily. The best well in the pool was the first well drilled, and was located on the southeast corner of the Hannah M. Harris farm, from whence the pool derived its name. This well started at 15 barrels of oil and close to 2,000 barrels of water, but at the expiration of forty days the water had about exhausted and the well produced 1,400 barrels of oil, being one of the remarkable wells of Indiana. This pool was located just at the edge of the Godfrey reserve, known as Indian lands, upon which later some fair wells were found. The Nottingham pool as well as the Muncie and Geneva pools was also rich, but the fading away of the gas supply made all the pools look alike to the oilman.

"Outside of the Trenton rock field and in the western section of the State, the past few years has shown some production in Gibson, Pike, Vigo, Sullivan, Martin and other counties, but nothing like the early wells in the Trenton rock section of the State.

"It is remarkable the number of wells that can be drilled in an oil field within a few years and the great number that can be

abandoned. As near as can be gleaned since development work started in the oil fields of the State, there have been 17,164 oil wells abondoned out of a total producing number of 28,279 wells. This does not include the dry holes and gas wells. The greatest number of wells completed in any one year in the Indiana field was in 1902, when a total of 3,914 wells were completed, and the years of 1902-3-4 were the most active in the history of the field.

"The Grant County field was exhausted of its production more rapidly than any other county in the State, as over 5,000 oil wells have been abandoned in the county, with Wells County a close second, although the last named had a great many more wells and produced for some years before Grant County was developed.

"The number of wells completed yearly in the State is of interest to all identified with the past industry in that once active and productive oil field.

"The following table gives the number of wells drilled in the Indiana field each year since 1892 and with the number drilled previous to that year. The figures give the total number of completions with the number that were oil wells and the dry holes and gas wells.

YEAR.	*Comp.*	*Oil Wells.*	*Dry and Gas.*
Prior to 1892	1,306	405	901
1892	296	220	76
1893	665	519	146
1894	1,808	1,413	295
1895	2,711	1,957	754
1896	1,637	1,185	452
1897	1,041	761	280
1898	1,102	758	344
1899	2,223	1,706	517
1900	2,963	2,323	640
1901	2,586	2,144	442
1902	3,914	3,283	631
1903	3,686	3,310	376
1904	3,766	3,366	400
1905	1,922	1,678	244
1906	1,185	1,043	142
1907	655	529	126
1908	402	317	85
1909	305	219	86
1910	366	300	66
1911	117	82	35
1912	89	65	24
1913	311	225	86
1914	744	471	273
Total	35,800	28,279	7,521